





# ON SECTION OF THE CORNEA AS A PRELIMINARY OPERATION.

By J. F. STREATFEILD.

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THERE are two instruments in common use which I never employ, and, as it seems to me that they are not only unnecessary, but also disadvantageous, I wish to unburden my mind in a matter which to most operators I have no doubt appears to be a mere eccentricity in my practice; as an apology for myself and by way of ventilating the matter so that it may be seen if my reasons are well founded, I allude to the lance knife and the long narrow knife now used in extraction of cataract. Some years' practice in operating, and without the two instruments in question, leave me no room to doubt but that I shall never use them any more. I do not think, whatever they may be in the hands of other operators, that they can ever be for me better than the instrument which I always use instead of either of them. But if theoretically either or both of these instruments can be proved to be better for their purposes than my own knife, I will begin again to make practical use of it, or of them, and to try them once more. *I have no peculiar instrument*, and when I say "my own knife," I mean only such a knife as I generally use. It must have just sufficient strength and stiffness not to be liable to bend; it must have a sharp point to enter the cornea easily, and a single sharp cutting edge to incise it. I find all these combined in a knife that was generally used in the latter days of the old semicircular flap extractions—Sichel's knife. This knife I therefore generally use when I have to open the anterior chamber. Indeed, I *always* use it unless I require only so small an opening as can be made by the direct puncture of a broad needle. If I have to make a larger opening, to make an incision in the cornea (however small a section may be required), I very much prefer Sichel's knife (or any other having such qualifications), in any of the modern operations requiring a preliminary section of the cornea, to any of the instruments generally used for the purpose in these operations. Especially do I believe it to be very superior to the lance knife in iridectomies, or to the long narrow knife in extraction of

cataract. In either of these operations, as I have said, I use Sichel's knife. In extracting cataract, however, I never make a counter-puncture. The eye must be perfectly well fixed, and secured with speculum and forceps. The patient is inert by anæsthesia, I then enter the point of the knife at either extremity of the section I intend to make, *at such inclination to the surface (I mean more or less perpendicularly) as may seem desirable*. In this way I can direct the knife to the centre, whether of the anterior chamber, of the pupil, or even of the eye itself, in any case. I pass it on into the anterior chamber more or less until the point is near the iris, and then it is turned outwards, away from the iris towards that part of the cornea I am about to cut through, and, *holding the knife firmly, maintaining the same inclination*, and pressing it onwards in the direction it is to take (with a slight sawing movement if necessary), it is advanced more and more, and very steadily, in the direction and to the limit I have assigned to it beforehand. *I never allow the point of the knife to transgress the pupil* at any time or stage of the proceedings or under any circumstances, but keep it always in the circumference of the anterior chamber, always in view between the cornea and iris, and in front of the latter. The sweeping section need not be very quickly made, nor should it be made very slowly, as the aqueous humour begins to escape as soon as the knife is made to glide onwards after the point has been turned away from the centre and is skirting the anterior chamber. But there is plenty of time to complete the longest section. Sometimes the knife can be run round the margin of the cornea in the assigned direction as easily as a curved line may be drawn on the black-board. The end of the section is made in one of two ways, both *practically* alike. I either bring the knife, as I am withdrawing it, gradually into the position, radiating from the centre, in which it was entered, or I make the point of the knife, turned from the centre, cut its way out suddenly (see Fig. 3). In either way *this extremity of the incision is made as square to the surface and in the same direction, radiating from the centre, as that made at first*, when the knife is entered. Let me compare this fairly with the use of the two instruments I have given up.

1. *The lance knife: iridectomy*.—*a*. It does not cut well, the point is so obtuse. *b*. It must be made to transgress the pupil and (in glaucoma especially) the lens is dangerously near. *c*. It *must* divide the cornea very obliquely, for, if the thrust were made at all perpendicularly to the surface, the lens would certainly be wounded. So that, *d*. It cannot make an opening close internally to the greater circumference of the iris. *e*. It can only make an incision all in one plane.

2. *Von Graefe's knife: cataract extraction*.—*a*. It makes the end of the incision at which the counter-puncture is made very (deceptively)

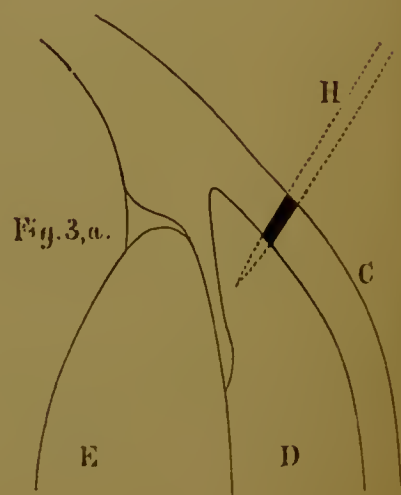
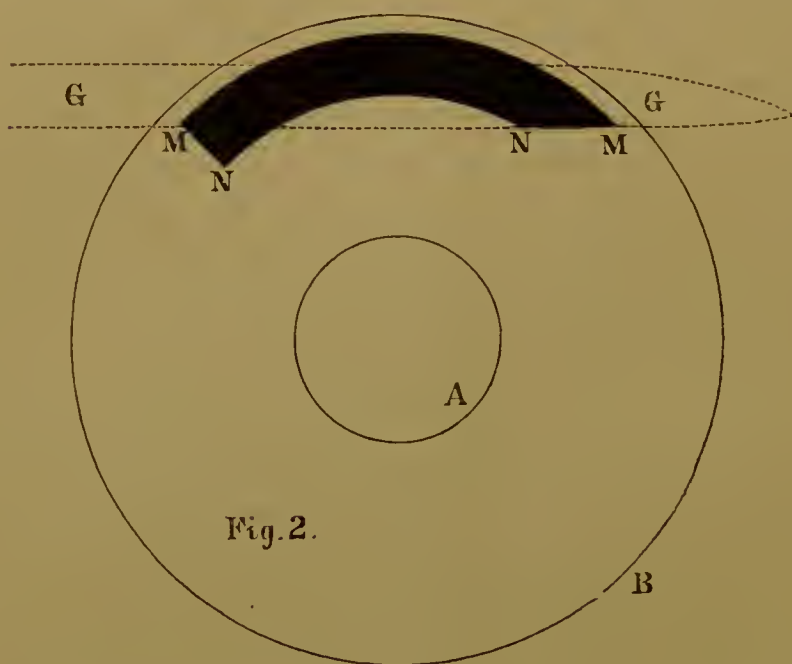
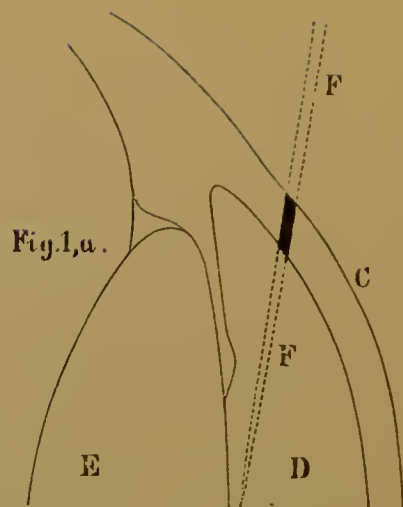
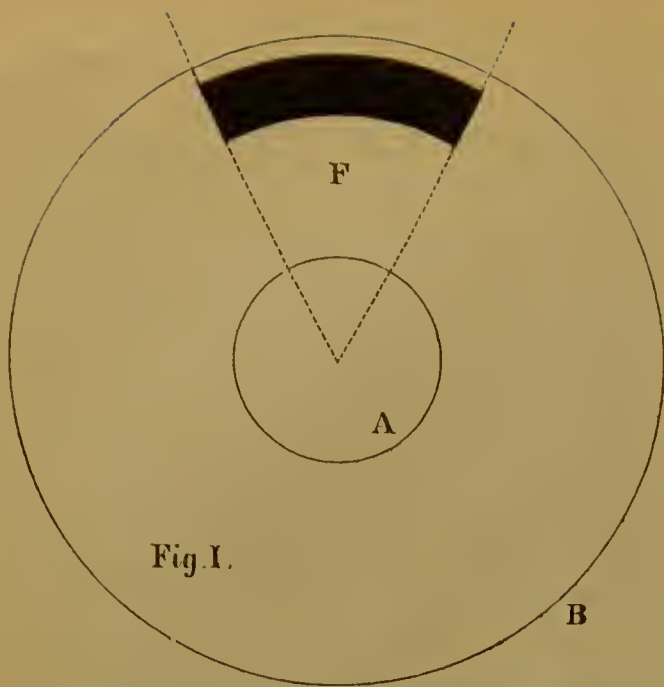


large externally and small internally. It would not be so, of course, if the old *semicircular* section were made, but of anything less than this it is true, and the smaller the segment of the circle included in the section, the smaller is the comparative size of the opening made internally as compared with its *external* dimensions. This inner and smaller dimension of the corneal opening is the only one practically available. *b.* It must divide the cornea very obliquely as it passes through it, or the knife could not reach the point of counter-puncture. And when the counter-puncture is made, its course is no longer free. It must continue in the same course as the incision is being completed. For the corneal opening to be large enough in the counter-puncture way of incision, it must be made much larger externally than it need be. And moreover it does not lead so directly to the cataract as when the incision is made (as in my way) more perpendicularly to the surface, more backwards, more towards the centre of the pupil. I am aware that Von Graefe's incision was *not* made wholly in the cornea, then of course it would not be so very oblique; but incisions into the anterior chamber should be, I believe, made only and wholly in the cornea, so I have not considered the other case.

In the way I have for many years adopted and beg now to recommend—*a.* The corneal opening is not contracted in size internally. *b.* The two extremities of the corneal incision are both square (in lines radiating from the centre), admitting thereby more easily the exit of a cataractous lens by the larger opening thus made. *c.* The whole extent of the incision is inclined to the surface, more or less perpendicularly, and directed backwards and to the centre (of the eyeball) as much as may be desired in any case. Thus, for instance, the greater circumference of the iris, in glaucoma, is reached. *d.* The line of the incision may be curved, not only as the outline of the cornea is curved, but the incision need not be all in one plane. *e.* The lens cannot be wounded.

With a lance knife a straight thrust is made into the eye, and for practical purposes, as far as concerns the corneal opening that is made, all in one plane. With the long narrow knife it is an equally straight thrust, and for practical purposes it is also all in one plane, but the incision is completed by cutting outwards. There can be no inclinations, varying more or less from the perpendicular, in the surfaces of the incision, however desirable, or any curves or change of plane in its course.

In making corneal incisions, I am always anxious that they should be ample and entirely corneal. As I would never let the knife transgress the pupil, so would I never pass with it beyond the cornea into the sclerotic, or very near it, into the vascular and nervous parts thereabouts. If the incisions have extended into the sclerotic, we often see—*a.* The



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The great advantages of my section of the cornea are, I believe, 1st. That both extremities of the incision are square and an opening is made for practical purposes as large internally as externally. 2nd. That it need not be all in one horizontal plane, but may be made more perpendicularly or as little oblique as may be desired in any case. 3rd. That it *cannot* extend beyond the cornea.

EXPLANATION OF THE PLATE.

Fig. 1. Section of the cornea made by the thrust of a lance knife.

1 a. Profile view of the upper half of the same subject.

2. Diagram of a small (corneal) section made by counter-puncture.

„ 3. The more perpendicular section of the cornea that is now recommended.

„ 3 a. Profile view of the upper half of the same subject.

A. The pupil.

### B. The sclero-corneal junction.

### C. The cornea.

#### D. The anterior chamber.

E. The lens.

F, F. The lance knife.

G, G. The long narrow knife.

H, H, H, H. Sichel's knife.

M, M. The ostensible corneal opening made by counter-puncture.

N, N. The real	ditto	ditto.
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P, P, P, P. The course now recommended to be followed by the knife.







# NEEDLE-HOOKS

IN

## SECONDARY CATARACT OPERATIONS.

By J. F. STREATFEILD.

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It is a very numerous class of cases in which, when the lens has been removed by extraction of cataract or otherwise, there is found to be a membranous opacity in or behind the pupil, for which it is necessary that some operation be done in order to get unobstructed admission of light and to gain good vision. The opacity is either the essential result of the cataract, of which the greater part has been removed, or it is a consequence of an adventitious inflammation following its removal; and the opacities vary in all degrees from the film which can only be seen at all by the concentrated light of oblique illumination, when the pupil has been dilated, to the dense white mass filling the contracted pupil that cannot be dilated. With these extreme cases—the most serious of the results of inflammation, I am not now concerned—an iridectomy is required, and subsequent proceedings such as may be then shown to be necessary. Nor am I concerned in the cases of the other extreme, those in which the opacity is of the slightest kind and only to be discovered by the concentrated light of oblique illumination; in these cases a single fine needle is all-sufficient, and by its use a perfectly satisfactory result is with the greatest facility obtained. The needle passes through these films without any feeling of resistance or any appearance of dragging upon any of the parts concerned. The cases of which I wish to speak are those in which generally of late years, when any considerable resistance has been anticipated, or when, in the use of the first needle employed, it has been experienced, a second needle has been introduced on the opposite side and the dragging thus has been divided between them, each counteracted the other, and the dragging laterally was not much in any *one* direction. This was a wonderful improvement—the resistance and dragging force are halved and

distributed, but it is not perfection, and therefore we need not be satisfied with it. The dragging laterally in these operations is not the only dragging. There is a dragging to the side towards which each needle is being moved, counteracted by the *two* needles, but *there is also a dragging backwards*, which is unopposed, when the needles will not enter at first and also afterwards, when the rent can only with difficulty be made because of the toughness of the membranous opacity *and because the points of the needles are less widely separated than any other parts of them*. Any amount or kind of dragging is to be feared for its effects on the circumferential parts to which the membrane is attached, and the greater probability therefore of an after-inflammation. But it seems to me that there is a specially prejudicial effect of this *backward* dragging of which I speak—viz., that it compresses the vitreous body, and when the membranous septum is opened and the needles have entered (perhaps very suddenly at last) and they are at once separated, there is a sudden and violent and considerable prolapse and displacement forwards of vitreous humour. When the rent is made in the membranous septum with some force, more or less exerted in the backward direction, the vitreous humour advances by reason of its natural elasticity, *and it is led forward by the stems of the two needles inserted deeply into it*. Now if this displacement were slight I should not consider it any objection to the operation; indeed, I believe a slight prolapse of vitreous humour in these cases for a time to be actually an advantage by distending the newly made opening, keeping its edges apart for awhile; and as it tends also to a *rounding* of the aperture, but we cannot make certain of this moderate result, and if a large quantity of the vitreous humour be made to advance through a somewhat narrow aperture in the membranous septum, it becomes locked there and never recedes: it hampers the iris in its movements so that it cannot contract, and robs the vitreous chamber of some of its proper contents. I speak of general recollection, but, again, I do not think the results of such cases are altogether good in respect of vision. These cases in which a considerable part of the vitreous humour is brought forward and locked in the aqueous chambers, as a result of the needle operation for membranous opacities after removal of a cataractous lens, may be recognised by a very deep anterior chamber, by a very much rounded and irregular and well-defined black aperture in the opaque septum, the pupil of considerable size, and never contracted or capable of contraction, and if at the time of the operation the iris has been made to bleed, the case is then quite unmistakable by the appearance of a ring of blood all round the circumference of the anterior chamber—that is to say, in the small part of it not occupied by the vitreous protrusion, which is of course transparent.

The iris is much displaced and drawn backwards, out of its natural position, perhaps also it is in some degree compressed. The eye has a very ugly, unnatural appearance, and, as I have said, the final result of the case is incompatible with good vision. The results I have been describing are no doubt the worst, but I have been led to fear any considerable displacements of the vitreous humour in the ordinary operations, and when the vitreous body has not been thus permanently locked in the aqueous chambers and has receded, the risk of its not receding has been incurred, and much dragging force in the backward direction has, at any rate, been exerted on the circumferential parts at the time of the operation, by which an inflammation might have been excited.

[The *object* of the secondary operations for cataract is, I presume, to gain a sufficiently large central aperture in the opaque membrane, and to do this with as little disturbance of the neighbouring parts as may be. I do not often myself like to attempt the removal of these membranous opacities altogether in any way. As to the *time* of operating, I believe that if the pupil can be well dilated with atropine, the operation should be done as soon as all appearance of redness in the ciliary region has finally disappeared. For these membranous expansions, at all events if there has been inflammatory mischief, become more and more tough and hard to tear by age, so that the operation should not be very long deferred. But nevertheless if there has been iritis, and especially if there are posterior synechiæ which cannot be detached by atropine, and prevent the dilatation of the pupil, I think, for fear of a consequent recurrence of iritis, the operation must be deferred for a month or more after all redness has disappeared in the eye.]

The use of two needles at once, acting and counteracting for and against each other, was originally Mr. Bowman's improvement, and was suggested by him twenty years ago. About three years ago (see the "Ophthalmic Hospital Reports," vol. vi. pp. 209-213) Dr. Agnew and Dr. Noyes of New York suggested further improvements. The former of these gentlemen (*loc. cit.*) makes two opposite openings in the corneal margin, one after the other, and the broad needle in one of the openings is advanced so as to penetrate the membranous septum, and held in this position. Then a small hook is entered at the opposite opening in the cornea and through the hole made in the septum, and then, with the broad-needle as a point of resistance, the hook is made to tear an opening. Dr. Noyes (*loc. cit.*) uses two hooks introduced at opposite sides by openings previously made in the margin of the cornea, by puncture and counter-puncture, with a long narrow knife, which is also made to penetrate the



membranous septum before it is withdrawn, so as to get an opening by which the hooks are introduced. For in either of the operations last mentioned *blunt* hooks are employed. In either of them the aqueous humour must be almost entirely evacuated, and the anterior chamber lost.

The power that is obtained by the use of two hooks on opposite sides is very great, and has the inestimable advantage that it operates on the membrane itself, and does not drag upon the iris or other parts so as to create a probability of exciting inflammation by which the opening made may be very probably again closed. If there are no posterior synechiæ, but a dense or tough membrane behind the pupil, I would still use the two hooks; but then, although no dragging could be exerted on the iris by any other mode of operating, other parts behind the iris to which the false membrane is attached might be injured in the same way and with a no less serious result. It is a great disadvantage if, in using the two opposite hooks, the aqueous humour must be previously evacuated, and I am about to prove that this need not be done, but that on the contrary it may be all retained during and after the operation.

The advantages of the non-evacuation of the aqueous humour are, first, that we can *see* what we are doing so very much better when the cornea is normally distended, and secondly, that we have *a space* in which can turn about the hooks and do all this without bruising or even touching the iris, as they are introduced to the membranous septum upon which we intend to operate. I have always carefully avoided, in these cases, the removal of any part of the iris tissue or of the membranous septum itself, which, if I am not mistaken, Dr. Agnew and Dr. Noyes in their operations have, as a rule, drawn out and excised. My object has been to make a rent in the membranous septum without touching the iris or interfering with it in any way, so as to avoid the dangers of iritis and make a sufficient central pupil only. I have found that I could do this perfectly well by using two cataract needles bent at their ends into small hooks. The hooked parts should be of small extent and of slight curvature. At first (about a year ago) I made use of two of the common "sharp-hooks" that are sometimes used to recover a lens that is fallen into the vitreous chamber. But although I could introduce them, and make successful use of them, it was with very much difficulty, because they taper gradually to their sharp points. And since that time, I have had several pairs of "needle-hooks." The needles I have had thus bent are of the stouter kind of the ordinary cataract needles with the small lance-like points of cataract needles, and perfectly round beyond the part which is bent into a hook. The hook is  $\frac{3}{20}$ ths of a French centimetre in extent, and should make but a small section of a large



circle. In using them—an anæsthetic having been given and the pupil being dilated by atropine as much as possible—I first secure the eyelids with a spring stop-speculum, and then, with one of the needle-hooks in either hand, I place the sharp points of the hooks one on either side of the cornea near its margin, and then, the handles of the two hooks being close together or even across, I press the needle points into the cornea, observing first one and then the other, and when the hooked parts of the needles have traversed the cornea, the handles may be separated and brought horizontally, right and left, and the needles at the same time passed on towards the centre of the anterior chamber. The next thing is to turn the hooked extremities down towards the membranous septum and penetrate it in the centre. As soon as one of the needle-hooks has entered the membrane the point of the other is brought to oppose it, and the two being entered at the same place are drawn slowly in opposite ways. These membranes are often stouter or more tough in some parts than in others, and if the one hook seems to tear readily, and the other but little, the traction should be made principally with the latter, so that the aperture be made more centrally. It should be of some considerable size, as it will become afterwards somewhat smaller than it is at first, and when the rent is made and the needle-hooks are to be withdrawn, they are at first, each of them, advanced a little towards the centre of the opening and then turned with the points forward and brought in opposite directions towards the cornea; then the handles of the instruments being brought up and together, as at first, the instruments are easily withdrawn by following the little curve of the hooked ends as they are brought out.

The objections made to the operation are all on the score of the difficulty of its performance. Some have suggested indeed that the little hooked ends would be likely to be broken off within the eye, but I do not think this can ever happen if we employ a good instrument maker, and are careful in manipulation. I have never had iritis or any other ill result of the operation. The aqueous humour being all retained, we have *plenty of room* in the anterior chamber, and we can *see*, as I have said, perfectly well all that we do, and can proceed very leisurely. I *have* found the penetration of the cornea difficult; but then I, at first, had the “sharp-hooks” which have points like those of women’s sewing needles, not the little lancet-like points of cataract needles; and then I had a second pair of hooks too small and a third too much curved, and with another pair of “needle-hooks” that were made for me, though I could easily penetrate the cornea, I could not rotate them when entered, so as to turn the hooks downwards, because the flat part of the extreme ends of the needle-hooks extended, as

in some of the ordinary cataract needles, some way up the stem. Now the recurrence of any of these mistakes may be considered to be impossible. The needles should be of the stouter kind of ordinary cataract needles; the hooks should not be much curved; their points should be lance-like, but the flattened part of the points should not extend beyond the part that is bent into the shape of a hook; their stems should be equal in size, in each of them, throughout their length, so that, as in all well made cataract needles, the aqueous humour is perfectly retained whilst they are in use.

With two hooks a *very much increased power* in making and regulating the size of the opening is gained, the risks of dragging the membranous septum *in a backward direction* are obviated, so that the chances of inflammatory mischief are very much lessened and much displacement of the vitreous humour is rendered impossible.

In Mr. Bowman's operation the lateral dragging is obviated and the aqueous humour is retained: in Dr. Noyes' operation the backward dragging also is obviated, but the aqueous humour is evacuated: with a pair of needle-hooks the lateral and backward dragging are both obviated and the aqueous humour is retained, the iris is unaffected, and all the steps of the operation are apparent.



